

REMARKS

In the July 11, 2001 Office Action, several drawing corrections were required. Additionally, claims 1-20 were rejected under 35 U.S.C. §103(a) as being unpatentable over Lee as having a well-known equivalent parallel/series circuit connection, or in combination with either Barge, Anderson et al, or Webster. In response, claims 1-3, 9, 10, 17 and 18 have been either amended or cancelled to overcome the above rejections. Corrected drawings are also submitted herewith addressing the concerns stated in the Office Action. Reexamination and reconsideration of the application, as amended, is requested.

DRAWINGS

The drawings have been labeled in Sheet 2 as FIG. 2A, and FIG. 2B. In Sheet 9, the lower right figure has been re-labeled FIG. 10B. In FIG. 3A, the phase coils are now shown to be connected and parallel. All corrections have been made in red, and are attached hereto.

CLAIM REJECTIONS UNDER 35 U.S.C. §103

It was asserted in the Office Action that the present invention was unpatentable over the Lee reference as differing only from this reference by utilizing a parallel circuit connection versus a series circuit connection, as shown in Lee. One of the differences between the Lee device and the present invention is that the present invention uses parallel stator windings instead of series windings. It has been found that using such parallel stator winding provides better safety, allows the use of finer

wire by lowering coil resistance, enables the motor to be manufactured much easier, and it has been found that motor operation is more efficient.

However, there are other differences between the Lee device and the present invention. As recited in claim 1, the commutation encoder includes an annular ring having at least one light detecting portion having opposite vertical edges which functions as a sensing area. The Lee device uses an annular ring having inclined light detecting portions, requiring adjusting the distance between the photosensors. The annular ring of the present invention using vertical light detecting portions allows the adjustment of the width of the light sensing portion of the annular ring.

The formulas for determining the width of the light detecting portion, the number of light detecting portions, and the interval between each of the photo-transistors was previously recited in dependent claims 2, 10 and 18. These recitations have now been included in independent claims 1, 9 and 17. The formula for the width of the sensing area is significantly different than that described in Lee. The device of Lee uses a formula based on rise time delay. The inventor has discovered that Lee was in fact incorrect, and that such a mistake prevents any further development of the motor, as for example the increase in speed, power, and torque or other formula improvements. Lee fundamentally misunderstands the direct and quadrature torque relations, and his rise time delay assumption is incorrect and can be demonstrated as incorrect by calculations. Lee completely misses the reluctance torque development phenomenon in the motor, and provides no useful basis to exploit it. Using the structure and formulas of the Lee device would indicate that the device has different behavior at different speeds. The motor of the present invention does not, however, show such different behavior at different

speeds as the formulas used in the present invention take into account direct and quadrature torque production. The combination of the vertical light detecting portions and new formulas provide increased accuracy and control to achieve high torque, high speed and high efficiency over a broad range of speed.

Neither the Lee reference, nor the Barge, Anderson et al, nor Webster references teach these distinguishing characteristics, nor render them obvious to one skilled in the art.

Accordingly, applicant believes that the claims, as amended, are patentably distinguishable over the Lee reference and should be allowed, notice of which is hereby respectfully requested.

Respectfully submitted,

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